

THE FIRST FIFTY YEARS OF X-RAY USE IN QUEENSLAND

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The discovery of X-rays by Röntgen in 1895 was a dramatic event in the history of science in general and medicine in particular. The use of the new technology was demonstrated in Queensland within months of its discovery. The early practitioners were dedicated people and some suffered radiation injuries. Thanks to their efforts, X-ray facilities in Queensland in the subsequent half-century were developed to serve a widely scattered population. An outstanding attribute of the early radiologists was their involvement in other spheres of scientific and community endeavour.

□ X-ray, radiation injury, history, Queensland.

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On Friday 8 November 1895, Wilhelm Conrad Röntgen, director of the Physical Institute of the Maximilian University in Würzburg, Germany, made a dramatic discovery. He discovered that when a high tension current was passed through a high vacuum or Crookes tube, rays emanating from it penetrated objects opaque to ordinary light and affected a photographic plate.¹ In a paper delivered to the secretary of the Würzburg Medical Society on 28 December 1895, he gave the name X-rays to those previously unknown rays.² The paper was published immediately and on 1 January 1896 Röntgen sent reprints together with examples of his first X-ray pictures to a number of colleagues.³ Within weeks the discovery was acclaimed as an event of major historical importance for both experimental science and medicine.⁴

The date of origin of the medical specialty that emerged from Röntgen's discovery is thus precisely known. Although the specialty is now termed radiology in Australia and many other countries, the term roentgenology is used in others in recognition of its founder. The late Dr Colin Macdonald of Melbourne has left an excellent account of Röntgen's personality and career.⁵

News of the discovery was reported in the Australian press on 31 January 1896.⁶ The story of the Australian X-ray innovators, both in physics and medicine, was told by J.P. Trainor in *Salute to the X-Ray Pioneers of Australia* published in 1946. Trainor noted at the conclusion of the chapter concerning Queensland:

'The all-too-brief records of early X-rays in Queensland reveal little of the work that must have gone in that vast state . . . One can only conclude that medical men were more concerned with immediate results than with compiling records for the use of future historians.'⁷

It is in the context of those remarks that I have undertaken this study. In a broader setting, the period 1895–1945 was dominated by two World Wars and the Great Depression. Radiology in Queensland did not escape their effects. I have not detailed all the technical developments that occurred but rather have attempted to place the progress of X-ray services in Queensland in the broader socio-medical sphere.

The passage of time has left alive only three practitioners who commenced their radiological training during the subject period — Drs Jim Bell, Gordon Donnan and Eileen Harrison (*née* Reimers). Obituary notices and anecdotes tend to present those of earlier times in a rosy light but one feature concerning many of the early Queensland radiologists must be emphasised. In various ways they made important contributions to the wider community. Outstanding among them were Hugo Flecker, Val McDowall and Clive Uhr who was knighted in 1972 in recognition of his services to Queensland. As well, their humanity was evidenced by deep concern for the welfare of their patients.

It is to all those involved with the development of X-ray services in Queensland — dentists, medical practitioners, nurses, physicists, radiographers, technicians and trade suppliers alike, that this study is dedicated. Omission of names and events can be attributed to my ignorance and not to any deliberate intention on my part.

THE EARLY YEARS

The first X-ray demonstration to the medical profession in Queensland was made by Mr J.W. Sutton in his laboratory at 29 Eagle Street,

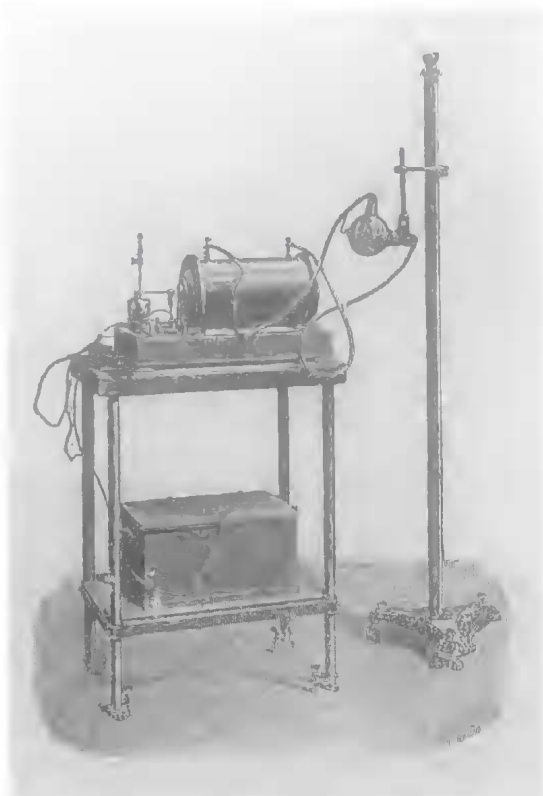


FIG. 1. Early X-ray machine used in Queensland. Prior to 1901 more than fifty of this type had been sold in the state, an indication of the ready acceptance of the discovery.

Brisbane on 16 July 1896.⁸ Mr Sutton had an engineering workshop at Kangaroo Point on the opposite side of the Brisbane River to his city office and laboratory.⁹ His medical audience included Drs Love, Lyons, Rendle, Taylor and Wheeler as well as Mr J. Campbell, president of the Brisbane Photographers' Society. A further demonstration was made at a meeting of the Royal Society of Queensland on 8 August 1896.¹⁰

Drs David Hardie and Wilton Love, who had honorary positions at the Hospital for Sick Children in Brisbane, were the first to use X-rays for clinical purposes in Queensland.¹¹ In 1913 Dr Hardie was knighted for his services to medicine. At a meeting of the Queensland Medical Society on 10 November 1896 Dr Hardie fluoroscopically demonstrated the chest and forearm bones of a child and in 1897 after another meeting concerning childhood fractures it was reported 'that his

[Dr Hardie's] practice, in private, as well as with cases from the Children's Hospital, was to take a skiagraph before setting, another after and if the latter was unsatisfactory to reset.'¹² Dr John Thomson, surgeon at the adjacent General Hospital, reported that Dr Love had localised a shotgun pellet in a patient's ankle thus facilitating the pellet's removal.¹³ Dr Love is regarded as the pioneer X-ray specialist in Queensland and his first equipment comprised a 6 inch spark coil with a mercurial interrupter.¹⁴ Primary current was derived from a bichromate battery and the tube was less than 3 inches in diameter. Dr Hardie's equipment comprised a Newton 6 inch coil, 'Focus' tube and Leclanche battery.¹⁵ An exposure of 20 seconds was required for digital examinations. The pioneering efforts of Drs Hardie and Love were officially recognised at the Hospital for Sick Children when X-ray apparatus was installed in 1908.¹⁶

Another Brisbane X-ray pioneer was Dr Andrew Doyle who first used X-rays in northern New South Wales in 1900.¹⁷ After a period of practice in Roma and St George he came to Brisbane and in 1908 was appointed honorary radiographer at the General Hospital where X-ray apparatus valued at £150 had been installed in 1903.¹⁸ In 1909 Dr Doyle published his findings in relation to the therapeutic effects of X-rays on bacterial skin



FIG. 2. Dr Wilton Love considered to be Queensland's first X-ray medical specialist.



FIG. 3. Dr David Hardie (circa 1910). In 1913 he was knighted for his services to medicine.

disease.¹⁹ In 1914 he supervised the installation of X-ray equipment at the Mater Hospital and subsequently served there in an honorary capacity.²⁰

Queensland is decentralised and the early provision of X-ray facilities in extra-metropolitan centres reflects that fact. Dr Vivian Voss of Rockhampton was in London at the time of Röntgen's discovery. He purchased X-ray equipment and was using it soon after his return to Queensland.²¹ By 1906 Dr Robert Huxtable of Charters Towers had already replaced his first X-ray apparatus. He was the first in Australia to install a Koch transformer with Noden rectifying valves which allowed the use of alternating current.²² Dr Walter Nisbet of Townsville had experience with X-rays while serving in South Africa during the Boer War. His equipment was of high quality, comprising a 10 inch spark coil, gas engine and generator. He ultimately suffered from the effects of irradiation dermatitis and died en route to Brisbane to have two fingers amputated.²³

Then as now, medical users of X-ray relied on electrical engineers, technicians and trade suppliers. In addition to Mr J.W. Sutton, Messrs Barton and White, who were electricians, were early providers of X-ray services in Brisbane.²⁴ Mr F. Engels who worked for A.C. Jackson, a Brisbane firm of electrical engineers, is said to have explained the intricacies of electrical high frequency to Mr G.R. King, a Brisbane ambulance

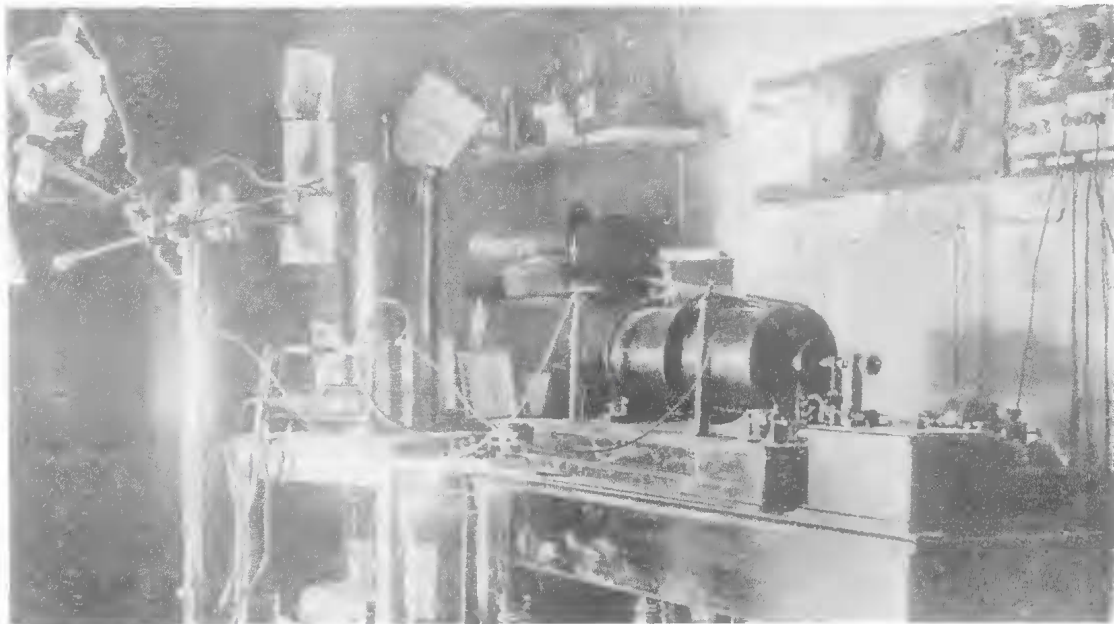


FIG. 4. Dr Walter Nisbet's X-ray room in Townsville. His experience with X-rays began while serving in South Africa during the Boer War.

officer.²⁵ In 1900 Mr King took an X-ray apparatus to Townsville when he was appointed senior officer to the newly established ambulance branch in that city. He was able to advise Dr W. Bacot, superintendent at the Townsville Hospital of deficiencies in the supplied X-ray apparatus and X-rayed the patients of other doctors. He was later employed by Dr Nisbet and subsequently returned to southern Queensland where he was still working in the X-ray department at the Ipswich Hospital in 1945. His remarkable career thus spanned the first 50 years following Röntgen's discovery.

Carl Zoeller had supplied Mr King with an X-ray tube at a cost of 30 shillings before he left Brisbane for Townsville in 1900.²⁶ In 1896 Zoeller had commenced business at the 'Courier Building', Queen Street as an importer and manufacturer of surgical and veterinary instruments.²⁷ In a trade brochure circulated in 1901 he advised that he had already sold 50 X-ray machines in

Queensland.²⁸ In a 1905 brochure he notified the medical profession that a room, fully equipped with the latest Schall X-ray and high frequency apparatus, was available for the exclusive use of the medical profession at his Queen Street premises and that Miss Payne, a trained assistant, would carry out treatment according to referring physicians' instructions.²⁹

The range of X-ray uses, both diagnostic and therapeutic, increased rapidly in Queensland in the early years following Röntgen's discovery. At a meeting of the Queensland branch of the BMA in 1912 Dr D.A. Cameron presented radiographs of renal calculi.³⁰ The superintendent of the Roma Hospital reported in 1914 that, 'the institution of an X-ray unit, electrical department, and of a bacteriological laboratory was essential, in order that the work of the hospital might be carried out in a satisfactory manner'.³¹

A major technical advance in X-ray tube con-



FIG. 5. The X-ray room at the premises of Carl Zoeller at Queen Street, Brisbane, 1905. The technician was Miss Payne and the seated 'patient' was Miss Bunzli, one of Zoeller's employees.



FIG. 6. Dental films dated 20 October 1909, possibly the first taken in Queensland.

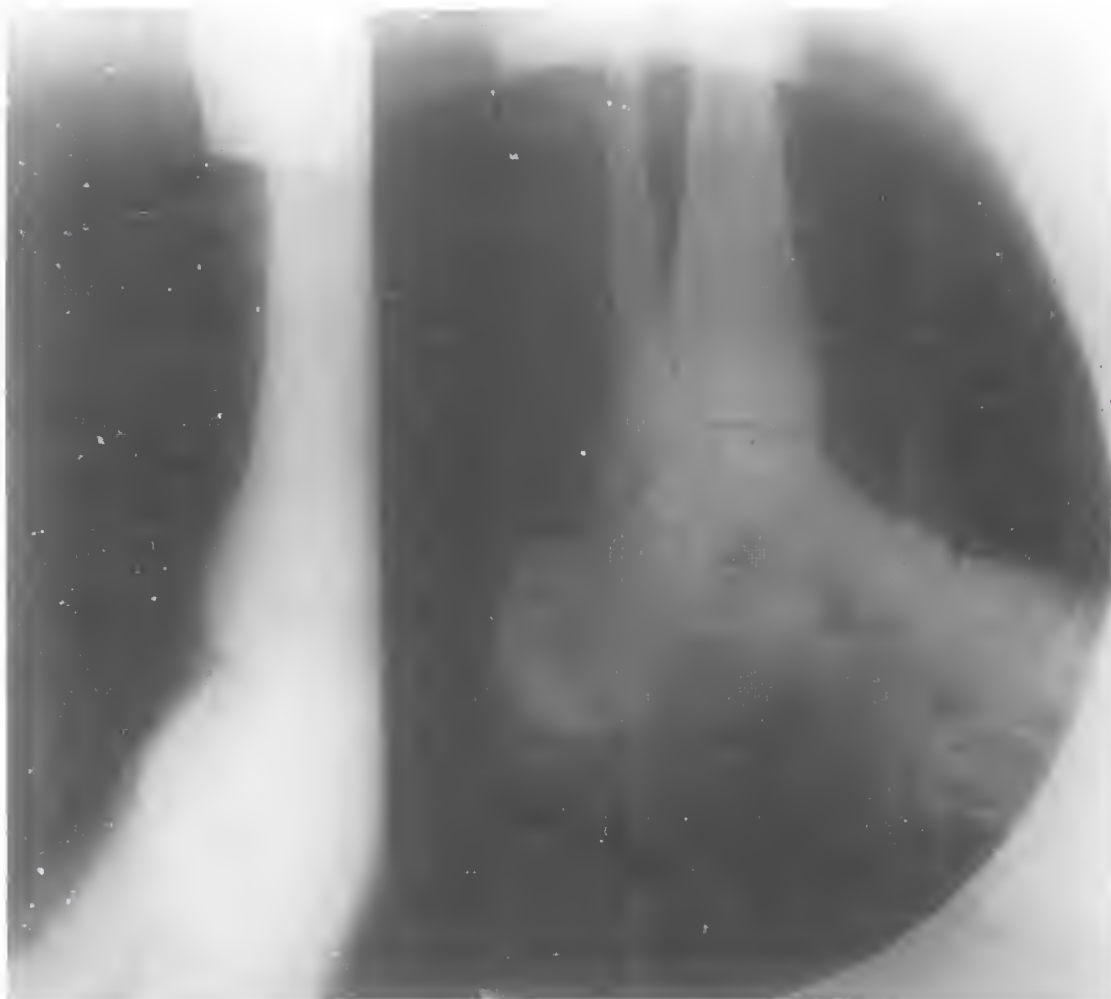


FIG. 7. A glass X-ray plate showing the ankle region. The supply of suitable glass was dramatically interrupted by the German occupation of Belgium. The result was a search for a new type of film base and the first of the modern types of film was produced by Kodak in 1918.

struction occurred in 1913 when Coolidge incorporated the hot filament into the cathode. The older, low vacuum tube had limited possibilities for radiation control, whereas the improved hot cathode, high vacuum tube had a stable and reproducible output and independent control of radiation quality and quantity.³² The outbreak of the First World War stimulated the development of X-ray film as a replacement for the then universally popular glass plates. Belgium was the major supplier of suitable glass but export ceased following the German occupation. In 1918 Kodak began to market *Dupli-Tized* X-ray film.³³ Emulsion was coated on both sides of the base in contrast to the single and often uneven application on the glass plates.

BETWEEN THE WARS

The Mater Hospital X-ray department was modernised in 1920. New plant was installed and duplitized film replaced the old glass plates. A new era began which 'brought joy to the heart of Dr Nisbet, in charge of the department, and Sister M. Augusta, his capable assistant'.³⁴ An increase in the departmental workload led to the appointment in 1924 of Dr B.L.W. Clarke, who had recently obtained the DMRE (Cantab.), as honorary assistant roentgenologist. Dr Clarke was also appointed honorary radiologist at the Ipswich Hospital in the same year.

In 1920 an appointment of long-term significance was made at the Hospital for Sick Children.



FIG. 8. Dr Tom Nisbet, son of Dr Walter Nisbet of Townsville, practised in Brisbane and Ipswich before he went to Sydney in 1929. A leading Australian radiotherapist he was the foundation president of the Australian and New Zealand Association of Radiology.

Sister B. Maynard was appointed assistant radiographer following Dr McDowall's resignation.³⁵ The indefatigable lady remained in charge of the X-ray department until 1946 when she was succeeded by Mr Les Payne.³⁶ She considered that her services during the Second World War, past the normal retiring age, to be a contribution to the war effort.³⁷

Drs Clarke, McDowall and Nisbet were to be prominent in state and national radiological affairs for many years. The 1920s saw the emergence in Queensland, with the earlier exception of Dr A.A. Doyle, of practitioners who specialised solely in radiology. In those years differentiation between diagnostic and therapeutic radiology did not exist. However, trends in that direction were developing and are illustrated by reference to the early career of Dr A.T. (Tom) Nisbet. He began X-ray practice in Townsville with his father and later moved to Brisbane when he was appointed to the Mater Hospital in 1921 and the Hospital for Sick Children in 1923. He practised in partnership with Dr Burnett Clarke at 'Lauriston', Wickham

Terrace between 1924 and 1928 and also established a practice at East Street, Ipswich in 1927.³⁸ He went to Sydney in 1929 and, in 1935, became the foundation president of the Australian and New Zealand Association of Radiology. He remained in that position until 1947 when he was succeeded by Dr Val McDowall. With hindsight, his distinguished career in radiotherapy could have been predicted by the quality of a paper which he presented at a meeting of the Queensland branch of the BMA on 7 November 1924. He described his early experience with the use of deep X-ray therapy for both malignant and non-malignant conditions.³⁹ This paper reveals Dr Nisbet's careful documentation of the pathological and therapeutic aspects of each case and his utmost regard for the well-being of his patients. He referred to the financial aspects of deep therapy treatment:

'Everyone, patient and medical man alike, is



FIG. 9. Dr Burnett Clarke, the first Queensland radiologist to obtain a higher degree in the specialty and a tireless worker for the Queensland Cancer Trust. He became a prisoner of war following the fall of Singapore in 1942.



FIG. 10. Dr Val McDowall, remembered as a pioneer of broadcasting by both radio and television in Queensland.

interested in the question of cost of this treatment. It is expensive but it must be realised that before a plant is installed and in running order £2,500 has been laid out which at 7% interest quite apart from depreciation, works out at £3 10s. per week. Add to this all the extra staff necessary, repairs, replacements and so forth and Coolidge tubes costing £86 apiece (none of which I have been able to use for more than two hundred and fifty hours and some considerably less) and you will understand that treatment given for two hours each dose cannot be given at half a guinea a time'.⁴⁰

Dr Val McDowall had succeeded Dr A.A. Doyle as honorary radiologist at the Brisbane General Hospital. He was the dominant figure in Queensland radiology between the wars and for a considerable period thereafter. Initially his practice was

located at 'Preston House', 371 Queen Street. In conjunction with his great friend Mr Tom Elliott of the Stanford X-ray and Radium Co., he pioneered broadcasting by radio and television in Queensland in 1920 and 1935 respectively.⁴¹ The radio-station 4CM was located in a studio next to 'Preston House' and broadcasts were made bi-weekly. The first television transmission was made from the Old Observatory, originally the convict mill, on Wickham Terrace.⁴² In 1936 he relocated his practice to 'Ladhope', Wickham Terrace.

When Dr McDowall commenced specialist practice in Brisbane in 1919 he practised both as a dermatologist and radiologist.⁴³ In 1926 Dr J.W. Heaslop was appointed assistant radiographer at the Brisbane General Hospital. (The term radiographer was then used on occasions for both medical and technical appointments in X-ray departments). Dr Heaslop, who had post-graduate experience in London, Edinburgh and New York, had been appointed honorary dermatologist at the Children's and General Hospitals in 1923.⁴⁴ In that era the extensive treatment of skin disorders by

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B.L.W. CLARENCE, B.S. D.M.F.F.
TEL. CENTRAL 6964

"LAURISTON"
WICKHAM TERRACE,
BRISBANE.

Dear Mrs Cook,
Thank you for sending Beryl
along. It seems an awful shame
that the psoriasis should recur so
badly. I will go & see Dr Heaslop
before next Wednesday & talk to him
about treatment. Otherwise her skin
is excellent
yours truly
Tom Nisbet
25.8.28

FIG. 11. Letter dated 25 August 1928 from Dr Tom Nisbet concerning Miss Beryl Cook who received radiotherapy for psoriasis in 1923 when aged seven. She suffered severe radiation dermatitis and required bilateral lower limb amputations in the 1970s when epitheliomata developed.

radiotherapy established a close relationship between the practice of dermatology and radiology, although not without tension in some centres.⁴⁵

In 1929 the first formal X-ray training position in Queensland was created at the Brisbane General Hospital when Dr C.W. Uhr was appointed radium and X-ray registrar.⁴⁶ He completed training in 1932 and commenced private practice at 'Ballow Chambers', Wickham Terrace. In 1938 he was appointed senior visiting radiologist at the Brisbane General Hospital.⁴⁷

Steps to rationalise non-surgical methods of cancer treatment on a statewide basis in Queensland began at the Mater Hospital in 1928. The establishment of a treatment centre followed Queensland's allocation of radium, purchased by the Commonwealth Government in 1927,⁴⁸ and has been described by H.J. Summers:

'The Queensland Cancer Trust, a body established by funds raised through public subscriptions and the Queensland Branch of the British Empire Cancer Campaign, purchased a modern



FIG. 12. Dr Clive Uhr immediately before his embarkation in Sydney for overseas service with the 8th Division of the A.I.F. He became a prisoner of war following the fall of Singapore in 1942. In 1972, he was knighted for service to Queensland.



FIG. 13. Dr Hugo Flecker, one of the pioneer Melbourne radiotherapists who left that city for Cairns during the Great Depression. He was renowned for his studies in natural history. The Herbarium in Cairns is named in his honour.

deep therapy outfit and installed it in premises provided in the Mater Hospital grounds rent free. So began a service which was to prove of inestimable value to people suffering from malignant diseases. It was the first deep therapy treatment clinic in Brisbane. Beds were made available in the wards for the treatment of patients by radium and deep X-ray'.⁴⁹

The preceding description of events in Brisbane does not mean that developments in X-ray facilities were confined to Queensland's capital but rather it reflects the paucity of recorded information from other areas. In the 1920s Dr H.J. Taylor installed diagnostic and therapeutic X-ray equipment in Townsville and his services were highly regarded throughout north Queensland.⁵⁰

In 1932 Dr Hugo Flecker, a pioneer Melbourne radiotherapist, left that city to establish a practice at Cairns.⁵¹ His interests transcended medicine and included research into many aspects of biology. The box jellyfish (*Chironex fleckeri*) was named in his honour in addition to other botanical and zoological species.⁵² His son Dr Pat Flecker of Townsville has written:

'In the early 20s he went by train (from

Melbourne) to Copley, in South Australia, and then rode a camel the next 70 miles to Radium Hill, near Mt. Painter, where a company called Radium and Rare Earths had a mine. They dug their ore, choosing this by means of a gold leaf electroscope, because the Geiger counter hadn't been thought of, and sent this by pack camel, train and ship to somewhere in Europe for processing. The mine was made uneconomic by the discovery of pitchblende in Canada, which broke the monopoly of the Belgian Congo. . . . In his own practice he had his deep therapy plant, which was powered by current which was rectified by a mechanical rectifier. This gadget took up more space than the X-ray plant, and was most impressive to watch — better than any fire-works display. . . . During the Great Depression, my father moved to Cairns. He was the first consultant in any speciality in the North. He took with him his mechanical rectifier and the machine to go with it, but used this very little. He did some work for the Queensland Radium Institute, but when he learned of the superior equipment available in Brisbane, he phased out this work, and carried out diagnostic work only'.⁵³

The discovery of X-rays was soon followed by the recognition of some of their dangers. Two of Australia's medical X-ray pioneers, Drs L. Herschel Harris and F.J. Clendinnen, published papers on the dermatological uses and dangers of X-rays in 1901 and 1908 respectively.^{54,55} Unfortunately, both were to succumb to the effects of irradiation, Dr Clendinnen in 1913 and Dr Herschel Harris in 1920.⁵⁶ Irradiation injuries continued to afflict both operators and patients in subsequent decades. In Queensland, Drs B.L.W. Clarke and R.G. Quinn developed severe dermatitis of the hands following prolonged, unprotected exposure during fluoroscopy. Dr Quinn's surgical career was ruined by the severity of his burns. It had been his practice at the Children's Hospital to manipulate fractures using fluoroscopic control. More tragic was the death in 1931 of Mr Lawrence Scarrabelotti at the age of 41 from malignancy considered to be induced from excessive irradiation.⁵⁷ Among other X-ray duties he assisted Dr Quinn during fluoroscopic procedures.

In the 1930s two Brisbane dentists, Messrs W.E. Earnshaw and A.U. McNaught suffered irradiation burns as a result of holding film during exposure. Mr Earnshaw required amputation of his right ring finger because of intractable pain associated with chronic ulceration.⁵⁸ He died in

1947 at the early age of 50 from Hodgkin's disease. Mr Arthur McNaught is remembered by Dr F.R. Vincent who acted as his locum in 1934:

'In retrospect it seems remarkable that there was a speciality in dental radiography at that time but demand was quite heavy from dentists for full mouth examinations (12-15 films), apical lesions, root fillings, impacted wisdom teeth and particularly as a precursor to orthodontic treatment. The equipment was huge, covering one wall of the room, across the ceiling and down the other side and was black in colour. The whole apparatus created quite a degree of tension in the patients because of the fairly high degree of noise and the Heath Robinson appearance. I believe this was one of the main factors leading to the holding of the films in the patient's mouth in order to immobilise them, thus causing the burning of the fingers of Eric Earnshaw and A. Ure McNaught. Having seen what happened to them I was determined never to hold a film during exposure. At that time, there was little thought of shielding the patient or the operator'.⁵⁹

The first formal step to initiate professional organisation among radiologists in Queensland occurred on 21 February 1930 when Drs B.L.W. Clarke, J.W. Heaslop, V. McDowall, A.J. Reye and L.J. Spence met to form a Radiological Section of the Queensland Branch of the BMA.⁶⁰ Drs Clarke and Heaslop were appointed chairman and secretary respectively. The interests of that body were not entirely scientific as problems with the Workers Compensation Office were discussed and a list of standard fees was adopted as follows:

'Fractures:	from £2:2:0	to £3:3:0
Head:	" £3:3:0	to £4:4:0
Barium enema:	" £3:3:0	to £5:5:0
Barium meal:	" £5:5:0	to £6:6:0
Gall bladder:	" £4:4:0	to £5:5:0
Chest:		£3:3:0
Dental films (single):		£1:1:0
Dental films (full set):		£3:3:0
Localisation of foreign body:		£3:3:0
Urinary tracts:		£3:3:0
Pyelogram:		£3:3:0
Spine — Lumbar:		£3:3:0
Spine — Dorsal:		£3:3:0
Spine — Cervical:		£2:2:0
X-ray treatment (minimum fee):		£2:2:0

Fee for Clergy and Nurses: Minimum half the usual fee. Doctors and dependants free'.⁶¹

On 20 January 1933 Dr Nisbet wrote from Sydney to Dr McDowall outlining proposals to form an Australian Institute of Radiology.⁶² On 16 May 1934 members of the Radiological Section met and agreed to join the proposed national body.⁶³ Those present were Drs Clarke, Heaslop, McDowall, Reye and Uhr and they also approved the membership application of Dr G.W. Mason. In 1921 Dr Mason had commenced practice in Townsville in succession to Dr Nisbet. The proposed Australian body became Australasian and the inaugural meeting of the Australian and New Zealand Association of Radiology (ANZAR) was held in Canberra on 17 May 1935.

The appointment of the X-Ray and Other Electro-Medical Equipment Advisory Board on 1 May 1935 was an event of considerable importance in relation to the provision of X-ray facilities in Queensland. In the preamble to its first annual report the board noted:

'For some considerable time the situation with regard to X-ray and other electro-medical equipment in Queensland has been recognised as being in an unsatisfactory state. Standards have been, to a large extent, arbitrary, and applications have been determined more by the salesmanship of visiting representatives of firms than by the actual necessities of the districts.'⁶⁴

The board's chairman was Sir Raphael Cilento, director-general of Health and Medical Services and the secretary was George Watson of the Chief Secretary's Department. The other members were Arthur Boyd, lecturer in mechanical and electrical engineering at the University of Queensland and Val McDowall, senior radiologist and radium therapist at the Brisbane General Hospital.⁶⁵ The functions and duties of the board are contained in Appendix I. The board rapidly asserted its authority and was to exert a dominant, centralising role in Queensland radiological affairs in the following decade. It noted in its second annual report:

'It was found that there was a general failure to appreciate that X-ray work is a specialty, and that the provision of a first class apparatus does not necessarily give good service unless the operator has special knowledge and can interpret the resulting skiagrams. This was particularly felt to be the case with regard to the interpretation of barium meal pictures, taken very frequently by operators unskilled in the interpretation of what is, perhaps, one of the most difficult of diagnostic procedures.'⁶⁶

In 1938 the board was in a position to report by reference to a map of Queensland that:

'It will be observed that there are now few material aggregations of population which are not within reasonable reach of some public X-ray plant, and in those few areas where this does not appear to be the case, private plants occasionally supply the necessities of the situation. This, of course, is reinforced further by the increased availability of aeroplane transport, which has made it possible for many persons in remote localities to be brought speedily and with a minimum of disturbance to places in which the most up-to-date radiological service is available'.⁶⁷

In the following year the board published a further map indicating the locations of both public and private X-ray installations in Queensland.⁶⁸ The *Medical Act of 1939* provided for specialist registration and when its provisions became fully effective in 1942 only three out of a total of thirteen specialist radiologists in Queensland practised outside Brisbane.⁶⁹ They were Drs Morris Beale (Toowoomba), Hugo Flecker (Cairns) and Leslie Halberstater (Townsville).

Dr J.G.M. Beale trained as a radiologist in London and obtained the FFR in 1939. He and Dr Flecker were the most scholarly of the Queensland

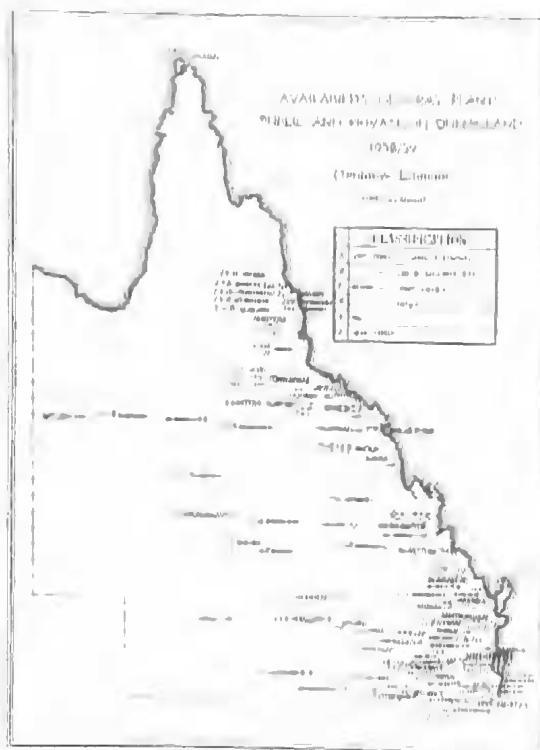


FIG. 14. Map of Queensland demonstrating the distribution of X-ray plants in public hospitals in 1938.



FIG. 15. Map of Queensland demonstrating the distribution of X-ray plants in public hospitals and private practices in 1939. Both this map and the one shown for 1938 indicate the efficient and centralising role of the X-Ray and other Electro-Medical Board founded under the chairmanship of Sir Raphael Cilento in 1935.

radiologists in both radiological matters and other pursuits. With regard to the latter Dr Beale was a classicist while Dr Flecker's studies in biology have already been mentioned. Dr Jim Bell remembers Dr Beale:

'Always a gentleman, learned in the arts, meticulous in radiology, he would in his lunch hour stroll back and forth on his lawn reading a Greek classic in the original until the stroke of two when he would doff his jacket, don a gown, and call the first patient from the waiting room',⁷⁰

His reports, written in long hand, contained references to the English and Continental radiological texts as well as to the journals from both sides of the Atlantic. In short, he was a true consultant.

Meanwhile to the south of Toowoomba in the border town of Stanthorpe, another radiological career was developing. Dr Harry Masel, who had conducted a general practice there since 1928, installed a modern fluoroscopy unit. His radiol-

ogical opinion was highly regarded in the region. After the Second World War he moved to Brisbane to commence specialist practice.

A description of country radiological practice in Queensland in the 1930s and early 1940s would be incomplete if it did not refer to the experiences of Dr Jim Bell whose career as medical superintendent of the hospitals at Alpha, Aramac, Bowen and Toowoomba spanned the period between 1933 and 1953. He wrote:

'There were Government specifications for X-ray machines at that time and two of these were noteworthy, namely that the installation was to be fitted with a hand piece timer and be capable of producing a radiograph of a lateral lumbar spine which had literally to be produced. I saw some of them and am quite sure that more than one slim junior office girl had had a brief career in modelling. At 10-15 ma I don't know about the skin dose but never mind.

The machine at Bowen was a Victor Wantz with a Coolidge tube, the filament of which was concentrically disposed. I don't know what the focal spot was but Watson Victor sold me an XP1-4 as a replacement. Service came from Brisbane once a year. The dark room was an enclosure between the tall stumps under the maternity ward which was built on a rather steep hillside. The machine itself was housed in the maternity day-room. There was no fluoroscopy but in the three years I was there I did the occasional I.V.P.

Jack Morley was the service engineer who came up from Brisbane. His boss was Harold Bull and when you visited Harold he would switch on his forty watt fluorescent light to show how much light it gave for a little current, such being the technology of the late thirties, Jack made the mistake once of servicing Bowen in the summer and was heard to remark that we developed our film at a temperature at which most people ate their soup. No matter — we had xrays.

Three years in Bowen and the next one came up. It was Toowoomba and a knowledge of xrays was required. . . . The next incumbent but one before me in the position had been Spencer Roberts.⁷¹ I know little of him except that he was one of the founding figures of radiology in Queensland and had left behind a glass case of tubes of all shapes and sizes, all with cold cathodes, one with the asbestos side tube for softening it and one, I fancy for therapy with an anode shaped like a corkscrew. I didn't have the sense to preserve them and I don't know what happened to them.

Suffice to say that the installation was a Victor Snook with mechanical rectification which soon had to be converted to self-rectified operation because of radio interference during the war. There was a Kearsley stabilizer, open overheads and cord reels. The fluoroscopy unit was Victor table, all plated rods and polished wood, with two positions, up and down, and nothing in between, so I christened it the good old Duke of York. The timer was mechanical with a large clock face and would measure a tenth of a second with tolerable accuracy and 75 ma was the maximum tube current.

We used to screen on 5 ma; it wasn't until later that protection was really put on the map, and anyway we were flat out protecting ourselves from high tension rods and wires in the dark. I myself have touched a dangling wire from a cord reel with an enema can held too high. Maybe the tube was not switched on, I don't remember — I was a bit dashed when I was told that it would have been only ten thousand volts, and in any case the patient didn't complain. Maybe the current followed my sweaty body to earth, maybe he was or wasn't hetero — I didn't ask and never found out.

Another time, I thoughtlessly flexed my knee under the table while screening a foreign body. Fortunately the side of my calf was pressed hard against the table frame which was earthed and I got a tiny exit burn . . . All this time I never saw a radiographer. Radiography was the province of the sister rostered on outpatients'.⁷²

In 1932 Dr E. W. Casey, known to his wide circle of friends as 'Case', succeeded Dr Clive Uhr as registrar at the Brisbane General Hospital and in 1938 became the hospital's first radiology supervisor. Those who knew him in Brisbane carry the fondest memories of him. Dr Aubrey Pye, former superintendent of the Brisbane General Hospital, and who almost certainly has met more doctors in Queensland than any other person, still recalls the exact place on a hospital stairway where he first met 'Case'.

Dr Casey, together with Dr H.C. Webster of the University of Queensland, Mr John Nebe of the Mater Hospital Cancer Clinic and Dr C.E. Eddy, director of the Commonwealth Radium Laboratory, advised the Queensland Government early in 1939 with regard to the purchase and installation of a deep therapy unit at the Brisbane General Hospital.⁷³ The association of Drs Casey and Eddy did not end there. Both were deeply committed to the initiation of formal training for radiographers and are remembered as the 'fathers' of the Aus-



FIG. 16. Dr Edward Casey, known universally as 'Case'. Founded the inaugural training course for radiographers in Queensland and together with Dr Cecil Eddy of the Commonwealth Radium Laboratory was instrumental in 'fathering' the Australian Institute of Radiography.

tralian Institute of Radiography.⁷⁴ Dr Casey was also the first chairman of the Conjoint Board. But those events were in the future and occurred at a national level. It is opportune to return to the question of radiographic training in Queensland.

Mr Arthur Knight, for many years the chief radiographer at the Brisbane General Hospital, had commenced his career there in 1924 when training was arranged on an ad hoc basis. Mr Oscar Queitzsch was another whose radiographic career began shortly after the First World War. He was living in Atherton in north Queensland and was a keen amateur photographer. That interest brought him to the notice of Dr L.J.J. Nye, who was superintendent of the Atherton Hospital. In 1919 Dr Nye invited the young photographer to work at the hospital. His duties included operation of the X-ray apparatus. The association of these two men was to be a long one but it was soon to be severely tested. The local branch of the Returned Services League (of which Dr Nye was



FIG. 17. Mr Arthur Knight, senior radiographer at the Brisbane General Hospital. An ardent collector of early X-ray material some of which is housed in the Queensland Museum.

president) objected to the appointment because Oscar Queitzsch was a German. However, no Australian was either able or willing to do the work and the appointment stood. In 1930 Dr Nye founded the 'Brisbane Clinic' and Oscar Queitzsch conducted its X-ray department for the next thirty-two years.⁷⁵

The inaugural meeting of the Queensland branch of the ANZAR was held on 14 July 1939.⁷⁶ Members present were Drs Casey, Clarke, Heaslop, McDowall (chairman), Mason, Reye and Uhr. Dr Casey was empowered to organise a training course for X-ray technicians at a fee of 2 guineas per term. Lecturers in the various Part I subjects were Mr S.G. Kennedy of the Brisbane Grammar School (Physics and Chemistry), Mr H. Snape (Photography) and Dr E.W. Casey (Anatomy and Physiology). Twenty-six candidates sat for the Part I examinations. At a further branch meeting on 3 June 1940 lecturers were appointed for Part II of the course.⁷⁷ They were Mr D.F. Robertson (X-ray Physics) and Mr R.J. Lydon (Electrical Technology). As a surplus of almost £100 was present in the technicians' course

account it was decided that no fee would be charged for the Part II lectures. It was also decided that a payment of 10 guineas be made to Miss Marshall in recognition of her services concerning the formation of the Queensland branch of the ANZAR and the arrangement of lectures for the technicians' course. Alice Marshall's long association with the X-ray department at the Brisbane General Hospital will be fondly remembered by radiologists and radiographers who trained there during the 1940s and two subsequent decades.

The composition of the foundation Part I course has been described by Miss K.M. Hoffman:

'It was a big class with about five radiographers from the Brisbane Hospital X-ray department, six trained nurses from the Brisbane Hospital, two nuns from the Mater Hospital, one trained nurse from the Ipswich Hospital, three staff members from the Cancer Trust at the Mater Hospital and about six radiographers from Wickham Terrace rooms. It was to have been a two year course but because of the outbreak of war the time was reduced to about one year due to several members enlisting in the forces'.⁷⁸

The trainees in that pioneer course who had nursing experience were uniquely placed to bring skill and comfort to patients requiring radiotherapy for malignant disease.⁷⁹ Outstanding among them was Sister Clare Falconer.

Miss Rita Mundell has also written her recollections of the course and early radiographic career: 'I was amongst the first to sit for the X-ray Technicians' Examination in Queensland. We qualified in 1941. My certificate, issued by the ANZAR in association with the Melbourne Technical College, is dated 6.8.41 (No. 26).

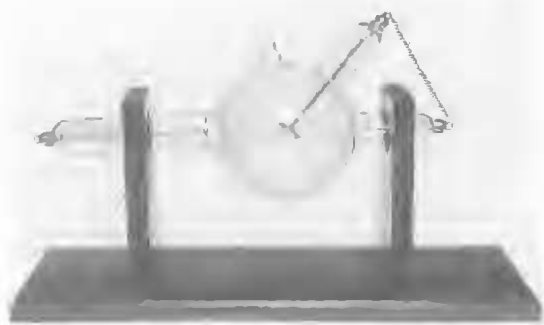


FIG. 18. A Müller X-ray tube, circa 1901. This tube is one of a pair housed in the Queensland Museum. It was collected by the late Mr Arthur Knight.



FIG. 19. Mr Oscar Queitzsch at the Atherton hospital in the 1920s. The photograph illustrates that protective lead aprons and gloves were available but unfortunately were not uniformly used during fluoroscopic examinations in those years.

Amongst those who participated in the course were Arthur Knight, Jim Clarke, Bill Drover and Frank Lawton. At that time I was with Dr B.L.W. Clarke of Wickham Terrace and prior to the course had been engaged in Radiography for approximately ten years. I still remember the lead glass enclosed tube which used to make my hair stand on end in damp weather (literally); the old Bucky diaphragm, heavy as lead, hand set and string manipulated and the wind-up screening unit. I think I was born 50 years too soon!⁸⁰

Mr Roy Moss was another graduate of the first Queensland radiographic training course and his certificate was number 24. He remembers Sister Mary Rose from the Mater Hospital and Sister Joyce Tweddell as fellow graduates.⁸¹ His father, Mr Edward Moss, was a pioneer X-ray engineer who commenced his training at University College Hospital, London in the early 1900s. He came to Sydney prior to the First World War to establish a branch of Newton & Wright. After war service in Egypt as an X-ray technician he moved to Brisbane in 1923 as the representative of Watson & Sons and is remembered for his remarkable ability to install and service equipment under the most difficult conditions.

War with Germany began in September 1939 and with Japan in December 1941. It was to have profound effects on Queensland's X-ray personnel and services.

THE WAR YEARS

In 1940 Dr J.R. Adam was the radium and X-ray registrar at the Brisbane General Hospital. When Dr Casey enlisted in the AIF Dr Adam was the sole member of the full-time staff and carried the departmental workload until Dr A.G.S. Cooper arrived in December 1940 to act in Dr Casey's position.⁸² Dr Cooper had obtained the DMR (London) in 1938 and was practising in New Plymouth, New Zealand at the commencement of the war.⁸³ Although his interests were directed towards radiotherapy he shouldered an enormous diagnostic workload in Brisbane during the war years owing to the extreme shortage of radiologists. Drs Burnett Clarke and Clive Uhr and Sister



FIG. 20. Mr Oscar Queitzsch, immediately prior to his retirement after more than forty years of radiographic service.



FIG. 21. Dr Arthur Cooper, first director of the Queensland Radium Institute.

Joyce Tweddell were members of the ill-fated 8th Australian Division and became prisoners-of-war after the fall of Singapore on 15 February 1942. Ambrose Eltherington, another graduate of the first Queensland radiographic training course, also became a prisoner-of-war when Java fell in the following month. The shortage of radiologists in Brisbane was somewhat alleviated when Dr Casey's unit returned from the Middle East. He was released from the Army and directed to return to Brisbane.⁸⁴ Dr Jock Adam was called up for military service early in 1942 and was replaced as registrar by Dr Eileen Reimers. In addition to her radiological duties she also worked as a casualty officer and gynaecological resident.⁸⁵

The rapid advance of Japanese forces throughout the islands to the north of Australia resulted in Queensland becoming a major base for the Allied forces. The headquarters of General Douglas MacArthur, commander of the South West Pacific Area, were in Brisbane. Large numbers of American military personnel arrived and their radiological services were dislocated as a result of the wreck of the *Rufus King*, a liberty ship, on South Passage Bar between Moreton and North Stradbroke Islands in July 1942.⁸⁶ Included

in the cargo was X-ray equipment for three general hospitals. Although a considerable amount of other material was salvaged in perfect condition the X-ray equipment was contained in a hold breached by the sea and was either ruined or required extensive repair.⁸⁷ Dr Cooper responded readily to the American request for assistance and as a result of his contact and subsequent friendship with various American medical officers he obtained supplies of radioactive phosphorus and was the first to use that isotope clinically in Australia.⁸⁸

Restrictions on the availability of X-ray film and equipment for civilian purposes were stringently enforced during the war period. A proposed radiological installation at the Cairns Hospital was deferred in 1942 'until conditions in the north became more settled'.⁸⁹ Presumably this was a guarded comment referring to the possibility of Japanese invasion. Under the National Security Regulations it was necessary for operators of specified X-ray equipment to provide screening so



FIG. 22. Sgt Ambrose Eltherington photographed at Tel Aviv on 4 October 1941. He was a member of the 2/2 Aust. CCS, commanded by Lt-Col E.E. 'Weary' Dunlop and was captured by the Japanese at Bandoeng, Java on 8 March 1942.

Watson mobile (or 190 V supply)
(Bandoeng)

Part	Pos	M.A.	Dist	Shut	Time
Wrist	A.P. Lat	60	36	1	1 1/2
Elbow	A.P. Lat	"	"	1	1 1/2
Shoulder	A.P.	"	"	2	1 1/4
Foot	A.P. & S.L.	"	"	1	1 1/4
Ankle	A.P. Lat	"	"	1	1 1/2
Knee	A.P.	"	"	2	1 1/2
	Lat	"	"	2	1 1/4
Hip	A.P.	"	"	3	2 1/4
Hand	A.P. & Lat	"	"	3	2 1/4
Chest	P.A.	"	48	2	1
Jaw	L	"	36	3	1 1/2
Leg (Plaster)	A.P. & Lat	"	"	2	1 1/2
Teeth	"	"	"	5	2 1/4
<u>With Buckley</u>					
Th. Spine	A.P. & Lat	60	30	5	5
L. Spine	A.P.	"	"	5	4
"	Lat	"	"	7	8
Skull	A.P.	"	"	5	5
"	Lat	"	"	4	4
Scapulas	P.A.	"	"	6	5

FIG. 23. Photograph from Ambrose Eltherington's war diary showing exposure factors used at 1 Allied General Hospital Bandoeng, Java prior to its capitulation.

that emitted radiation did not interfere with wireless transmission.⁹⁰ Detailed specifications were issued to screen existing X-ray areas and even more elaborate ones were required for the small number of new installations proposed at that time.

In Toowoomba Dr Morris Beale was called up and the civilian radiological workload of the city and surrounding districts was carried by Dr Jim Bell, superintendent of the Toowoomba General Hospital.⁹¹ Also located in Toowoomba was the 117th Australian General Hospital and its commander, for some of the war period, was Dr Val McDowall.⁹²

The vicissitudes of war resulted in Dr Gordon Donnan commencing his radiological career in Brisbane. In November 1942 during the New Guinea campaign he lost his left arm. He was sent to the 112th Australian General Hospital at Greenslopes to recuperate. He described his decision to specialise in radiology as follows:

'On discharge from hospital and while the powers that be were deciding what to do with me I was sent to Goodna Mental Asylum to categorise service personnel held there. This I did indifferently with Professor "Bromide" Dawson's "Aids to Psychiatry" in my lap. I lacked the temperament to be a psychiatrist and chose radiology because of its large clinical content. Kenneth Fraser, then DDMS Northern Command, had Val McDowall assess my ability to handle the heavy fluoroscopy equipment of the day. In early 1943 Casey left the army to care for Clarke's and Uhr's practices and I took over from him at 112 AGH, knowing nothing about radiology. He was a great and loveable man. I still remember the first entity he showed



FIG. 24. The liberty ship *Rufus King* wrecked on South Passage Bar between Moreton and North Stradbroke Islands in 1942. Included in the cargo was a considerable amount of X-ray equipment for the American forces in Queensland. That equipment, although salvaged, was almost entirely ruined.



FIG. 25. An auto-radiograph of a fern leaf following its uptake of radioactive phosphorus. This photograph was given to Mr Arthur Knight by one of the American medical officers assisted by Dr Arthur Cooper following the loss of the *Rufus King*.

me — an osteochondritis dissecans of the femoral condyle'.⁹³

Despite the many difficulties and uncertainties of the war years a decision of momentous importance with regard to the treatment of those suffering from malignant disease in Queensland was implemented on 2 March 1944 when the Queensland Radium Institute (QRI) was formed.⁹⁴ The decision followed the visit of Drs Ralston and Edith Paterson to Australia in 1943.⁹⁵ Dr Ralston Paterson was the director of the Holt Radium Institute in Manchester and was a leading authority on cancer treatment. He visited Queensland and other Australian states after first advising the authorities in New South Wales who had invited him and his wife to Australia. His recommendations, contained in Appendix II, were accepted by the Queensland Government. At the first meeting of the QRI Dr Arthur Cooper was appointed radiotherapist-in-charge, a position he held until 1946 when he became the Institute's first director.

The functions of the X-Ray and Other Electro-Medical Equipment Advisory Board, formed on 1 May 1935, were absorbed by the QRI and the board ceased to function independently.⁹⁶ The absorption explains why subsequent decisions relating to the purchase of diagnostic X-ray equipment for public hospitals in Queensland were vested in the QRI which otherwise lacked involvement with diagnostic radiology.

The Queensland Medical School had been founded in 1936⁹⁷ and at a meeting of the Queensland branch of the ANZAR on 25 July 1945 the question of radiology lectures to medical students was discussed.⁹⁸ Dr G.W. Mason advised that he gave lectures every two years in anatomical radiology and a series of ten lectures to fifth and sixth year students. Dr McDowall advised the following meeting on 26 November 1945 that he had recommended to the faculty board that detailed radiological instruction for students was necessary and that an X-ray museum for teaching purposes should be established at the Brisbane General Hospital.⁹⁹ A resolution was passed at the same meeting expressing pleasure at the safe return of Drs Clarke and Uhr from their long period as prisoners-of-war.¹⁰⁰

The concluding years of the war also saw the conclusion of the first half century following Röntgen's discovery of X-rays. The post-war years witnessed many new faces and developments in the progress of X-ray services in Queensland. But that is another story.

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I am grateful to Mr Peter Carlile for the photograph of the glass X-ray plate and to Professor Brian Kruger for the photograph of the early dental X-rays. Mrs E. Queitzsch kindly allowed me access to her late husband's photographic collection and Miss Beryl Cook allowed publication of Dr Nisbet's letter to her mother. The Queensland branch of the Australian Medical Association provided the photographs of Sir David Hardie, Dr Wilton Love and Dr Val McDowall,

past presidents of the branch. Drs Pat Flecker and Michael Uhr provided the photographs of their fathers. Mr Mel Eltherington provided the photographs of his father and the radiographic exposure factors used at I Allied General Hospital in Java. Photographs of Drs Edward Casey, Burnett Clarke, Arthur Cooper and Tom Nisbet are from the archives and journals of the Royal Australasian College of Radiologists and that of Mr Arthur Knight from the Australian Institute of Radiography. Mr John Gibbins gave me the photograph, originally given to him by Mr Knight, showing the uptake by a fern of radioactive phosphorus. The editor of the Brisbane *Courier Mail* allowed publication of the photograph of the *Rufus King* and the photograph of Dr Walter Nisbet's X-ray room is from *Salute to the X-Ray Pioneers of Australia*.

Mr Graham Duryea of Sidney Riley, Brisbane prepared many of the photographs, Mrs Cathy McLennan and Miss Linet Welten typed the manuscript.

REFERENCES

1. Trainor, J.P. 'Salute to the X-Ray Pioneers of Australia'. W. Watson & Sons: Sydney, 1946: 6.
2. Röntgen, W.C. Eine neue Art von Strahlen Vorläufige Mittheilung. *Sitzgsber Physik — Med Ges Würzburg* 1895; 132-141.
3. Glasser, O. Fifty years of Roentgen rays. *Radiography and Clinical Photography* 1945; 21(3): 58-66.
4. Gudden, F. A memorable date. *Electromedica* 1986; 51(1): 2.
5. Macdonald, C. Roentgen's discovery of the X-Rays and the pioneer Melbourne radiologists. *Victorian Historical Magazine* 1965; 36(4): 136-153 (Reprinted in *Australas. Radiol.* 1966; 10: 308-318).
6. Owen, M.D. Walter Drowley Filmer, 1864-1944. Australian X-Ray pioneer. *J. Coll. Radiol. Aust.* 1965; 9: 24-35.
7. Trainor, J.P. *op. cit.* : 67.
8. *The Week*. 17 July 1896; 6.
9. Queensland Postal Directory 1896-97.
10. Sutton, J.W. Experiments with Röntgen rays. *Proc. R. Soc. Qd* 1897; 12: 86-88.
11. Patrick, R. 'A history of health and medicine in Queensland 1824-1960'. University of Queensland Press: St Lucia, 1987: 384.
12. Hardie, D. Qld Med Society meeting. *Aust. Med. Gaz.* 1896; 15: 485 and *Aust. Med. Gaz.* 1897; 16: 561.
13. Thomson, J. X-rays in surgery, gunshot wound of the ankle. *Aust. Med. Gaz.* 1897; 16: 531.
14. Trainor, J.P. *op. cit.* : 63-64.
15. *ibid.* : 64.
16. Fison, D.C. 'The history of Royal Children's Hospital Brisbane'. Royal Children's Hospital Brisbane, Women's Auxillary: Brisbane, 1970: 13.
17. Trainor, J.P. *op. cit.* : 68.
18. Patrick, R. *op. cit.* : 385.
19. Doyle, A.A. Aspects of radiotherapy in relation to bacterial disease of the skin. *Aust. Med. Gaz.* 1909; 28: 534-537.
20. Summers, H.J. 'They crossed the river'. University of Queensland Press: St Lucia, 1979: 64.
21. Trainor, J.P. *op. cit.* : 64.
22. *ibid.* : 71.
23. *ibid.* : 66.
24. *ibid.* : 65.
25. *ibid.* : 65.
26. *ibid.* : 65.
27. Paterson, R. 'Internee 1/5126'. Robert Paterson: Annerley, 1983: 7.
28. Carl Zoeller & Co Ltd. Trade brochure in author's possession.
29. Zoeller, C. 'Twenty years in Australia'. Carl Zoeller & Co: Brisbane, 1905: 7.
30. Cameron, D.A. Qld branch BMA meeting. *Aust. Med. Gaz.* 1912; 31: 635.
31. Anon. Hospitals. *Med. J. Aust.* 1914; 2: 291.
32. Glasser, O. *op. cit.* : 61-62.
33. Anon. *Radiography and Clinical Photography* 1945; 21(3): cover 2.
34. Summers, H.J. *op. cit.* : 76.
35. Fison, D.C. *op. cit.* : 17.
36. *ibid.* : 18.
37. *ibid.* : 18.
38. Masel, J.P. Introduction, Nisbet symposium 1977. *Australas. Radiol.* 1978; 22: 200.
39. Nisbet, A.T. Twenty-one months with deep therapy treatment. *Med. J. Aust.* 1925; 1: 9-15.
40. *ibid.* : 9.
41. Obituary. Valentine McDowall. *Med. J. Aust.* 1957; 2: 920-921.
42. *ibid.* : 921.
43. *ibid.* : 920.
44. Obituary. James William Heaslop. *Med. J. Aust.* 1956; 2: 362.
45. Kaye Scott, R. Arthur Burrows. *Australas. Radiol.* 1982; 25th anniversary issue: 50-53.
46. Obituary. Clive Wentworth Uhr. *Med. J. Aust.* 1975; 1: 120.
47. *ibid.*
48. Kaye Scott, R. The radiant years. *Australas. Radiol.* 1978; 22: 6-31.
49. Summers, H.J. *op. cit.* : 91.
50. Obituary. Henry John Taylor. *Med. J. Aust.* 1982; 2: 207.
51. Macdonald, C. *op. cit.* : 149.
52. *ibid.*
53. Flecker, P.O. Letter to author. 21 August 1986.
54. Herschel Harris, L. Roentgen rays. *Aust. Med. Gaz.* 1901; 20: 60-67.
55. Clendinnen, F.J. The action of X-Rays on the skin. *Int. Med. Jnl* 1908; 13: 596-603.
56. Trainor, J.P. *op. cit.* : 33 & 47.

57. Scarrabelotti, W. Letter to author. 23 July 1987.
58. Clouston, P.N. (daughter of W.E. Earnshaw). Interview with author. 17 August 1986.
59. Vincent, F.R. Letter to author. 17 October 1986.
60. Owen, M.D. The archives of the Royal Australasian College of Radiologists. Guide to the history collection. H681-H705 sundry accessions, *Australas. Radiol.* 1979; 23: 15-19.
61. *ibid.* : 16 (H688).
62. *ibid.* : 16 (H692).
63. *ibid.*
64. 'Annual report director-general of health and medical services'. Gov. Print.: Brisbane, 1934-35; App C : 42.
65. *ibid.*
66. 'Annual report director-general of health and medical services'. Gov. Print.: Brisbane, 1935-36; App. D : 71.
67. 'Annual report director-general of health and medical services'. Gov. Print.: Brisbane, 1937-38; App. B : 90.
68. 'Annual report director-general of health and medical services'. Gov. Print.: Brisbane, 1938-39; App. B : 139.
69. *Qld. Gov. Gaz.* 1942; 158: 2114 & 2198.
70. Bell, J. Two letters to Doctor Hoy. *Australas. Radiol.* 1982; 25th anniversary issue: 59-64.
71. Roberts, S. Medical superintendent and radiologist at Toowoomba General Hospital 1930-7. Resigned as superintendent in 1937 but retained radiological appointment. Died 1939.
72. Bell, J. *op. cit.* : 62-63.
73. 'Annual report director-general of health and medical services'. Gov. Print.: Brisbane, 1938-39; App. B : 137.
74. Obituary. Edward William Casey. *J. Coll. Radiol. Aust.* 1963; 7: 138-140.
75. Nye, J.A. Letter to author. 23 June 1987.
76. Minute book Qld branch ANZAR : 2.
77. *ibid.* : 4-6.
78. Hoffman, K.M. Letter to author. 17 April 1987.
79. Tweddell, J. The history of radiotherapy in Queensland. *The Radiographer* 1975; 22(1): 4-7.
80. Mundell, R. Letter to author. 16 September 1987.
81. Moss, R. Interview with author. 14 November 1987.
82. Obituary. Arthur George Stening Cooper. *Australas. Radiol.* 1986; 30: 294-297.
83. *ibid.* : 295.
84. Obituary. E.W. Casey. *op.cit.* : 138.
85. Harrison, E.H. Interview with author. 5 March 1987.
86. Durbidge, E., Covacevich, J. 'North Stradbroke Island'. SIMO: Amity Point, 1981: 85 & 92.
87. Ahnfeldt, A.L., Allen, K.D.A., Coates, J.B., Jr (eds). 'Radiology in World War II'. Surgeon General, United States Army: Washington, 1966: 606-607 & 628.
88. Obit. A.G.S. Cooper. *op. cit.* : 296.
89. 'Annual report director-general of health and medical services'. Gov. Printer: Brisbane, 1941-2; App. B: pages not numbered.
90. *ibid.*
91. Bell, J. *op. cit.* : 61.
92. Obit. V. McDowall. *op. cit.* : 921.
93. Donnan, M.G.F. Letter to author. 13 August 1987
94. 'Annual report director-general of health and medical services'. Gov. Print.: Brisbane, 1943-4; App B: pages not numbered.
95. *ibid.*
96. *ibid.*
97. Doherty, R.L. (ed). 'A medical school for Queensland'. Boolarong Publications: Brisbane, 1986: *vt. seq.*
98. Minute book Qld branch ANZAR : 28.
99. Minute book Qld branch ANZAR : 30.
100. *ibid.*

APPENDIX I

Functions and Duties of The X-Ray and Other Electro-Medical Advisory Board
(from 1934-5 Annual Report of the Director-General of Health and Medical Services)

1. To report upon the standard of X-ray machines (including deep therapy machines) and equipment and other electro-medical and surgical equipment, which should be provided in the several public hospitals in the State, and organisation and staffing of X-ray departments.
2. (1) To prepare standard specifications and conditions of tender and contract for all X-ray and other electro-medical and surgical equipment for use in public hospitals, where such standard specifications have been prepared by an authoritative body in Australia or Great Britain. Where there are Australian standards, such standards shall be adopted and where there are no Australian standards, British standards shall be adopted.
- (2) To call all tenders for X-ray and other electro-medical and surgical equipment for use in public hospitals through the State Stores Board.
- (3) To report to the Minister upon all tenders received and to make recommendations thereon. In the consideration of tenders, the following matters shall be noticed and reported upon, namely:-
 - (i) General qualities of the several X-ray machines and accessory equipment tendered, or other electro-medical or surgical machines or equipment and accessory equipment.
 - (ii) In view of the fact that X-ray and

- electro-medical and surgical machines or equipment are usually provided by way of loan, the durability and robustness of the several machines or equipment tendered.
- (iii) Ease and rapidity of operation and performance of machines and equipment, and maintenance and operating costs.
- (iv) Technical data required to be submitted in the tenders and rating claims made by the maker for the machines and equipment tendered, and in the case of X-ray machines as also declared upon the rating plates affixed to the machines, which rating plates shall contain declarations of rating required by the Australian Standard Specifications or British Standard Specifications, or where there are no Australian or British Standard Specifications, as required by the Specifications of the Board.
- (v) Degree to which tenders have complied with the specifications, and whether non-compliance or a partial non-compliance with the specifications should disqualify any tender.
- (vi) Tests which have been carried out by the Board, or which the Board has caused to be carried out in respect of the several machines or equipment tendered in accordance with tests prescribed in Australian Standard Specifications or British Standard Specifications, as the case may be, or where there are no Australian or British Standard Specifications, in accordance with tests specified by the Board, and to report the results of such tests and to report the order of merit and quality of each machine or equipment tendered as shown by the tests and to certify whether the declarations of the makers of the several machines or equipment have been established by such tests.
- (vii) Having regard to the foregoing considerations, price and preferences as declared by the Government from time to time, to place the tenders in order of merit and value. In applying preference the Board shall report the country of manufacture of the machine or equipment tendered, and where the machine or equipment is not wholly manufactured in one country, the country or origin of the several component parts, and where the material from which the machine or equipment is manufactured is not produced in the declared country of manufacture, the country from which such material is obtained.

APPENDIX II

Report Concerning The Establishment Of The
Queensland Radium Institute
(from 1943-4 Annual Report of the Director-General of
Health and Medical Services)

The Queensland Radium Institute was set up as a direct result of the visit to Queensland of Dr Ralston Paterson and Dr Edith Paterson (his wife), two recognised specialists in the organisation and application of radiotherapeutic treatment for cancer. Dr Ralston Paterson is the Director of the Holt Radium Institute of Manchester, and came to this country at the invitation of the Government of New South Wales, subsequently courteously accepting an invitation to visit Queensland and to advise the Government here as to the cancer problem within this state.

Dr Paterson emphasised the essential nature of the centralization of the control of treatment. He considered that it should be placed in the hands of full-time specialists devoting all their care and attention to the disease in some suitably situated central institution. He did not consider that the State itself was large enough to justify the establishment of a new and completely separate structure, but thought that a wing might be set aside at the Brisbane Hospital, within which the Queensland Radium Institute could set up its separate existence, working in conjunction with the Brisbane Hospital and other hospitals in this area in order that specialist radiotherapeutic treatment might be applied under the best of circumstances.

The fact that the whole of the Queensland population of 1 million people is spread over what is relatively a vast area, led to the further suggestion that treatment facilities should be instituted at hospitals sufficiently far from Brisbane to act as subsidiary centres. In these hospitals, the cases are first grouped by the local medical men for expert diagnosis. It is intended that visiting medical men from the permanent full-time staff of the Queensland Radium Institute shall visit these subsidiary centres

In the case of the British and foreign machines or equipment, the certificate of the National Physical Laboratory, England, or a certificate recognised by the National Physical Laboratory, England, may be accepted.

regularly, and shall select from the patients brought to their notice all those who are likely to profit by treatment, either minor treatment which can be applied locally and immediately, or specialised expert treatment which can only be applied with the major facilities available in Brisbane under the control of the Queensland Radium Institute.

In order to facilitate treatment, anyone suffering from cancer who so requires it will be transported to Brisbane at the Government's cost; the treatment itself will be free.

Subsequently the Institute will extend its activities to include all forms of treatment for malignancy by arrangement with hospital organisations operating.

The Order in Council lays it down that the Institute shall co-operate with the hospitals in Brisbane, Rockhampton, Mackay, Townsville, Cairns and Toowoomba, and shall co-ordinate the organisations for the treatment of the sick established at these places. The hospital boards and the management of corresponding hospitals or institutions concerned are required by the Order to

co-operate also with the Queensland Radium Institute.

Provision is made not only for public, but for intermediate and private patients, and the control is placed in the hands of a body consisting of a chairman, a deputy chairman, and seven additional members, representative of the Brisbane and South Coast Hospitals Board, the Queensland Cancer Trust, the University of Queensland, the Queensland Branch of the British Medical Association, and a representative of the Mater Misericordiae Hospital.

The activities of the institute commenced with its first meeting on 12th April 1944.

It was considered appropriate that the activities of the X-ray and other Electro-Medical Equipment Advisory Board, which extended to the supervision of the provision of all X-ray apparatus to public hospitals, etc., their care, maintenance and servicing, should be one of the functions of the Queensland Radium Institute. The transfer of all papers and particulars has accordingly been made.